17-5 - Activity profiling reveals changes in the diversity and activity of proteins in *Arabidopsis* roots in response to nematode infection

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Cyst nematodes are obligate, sedentary endoparasites with a highly specialized biology and great economic impact in agriculture. Successful parasitism involves morphological and physiological modifications of host cells that lead to formation of specialized syncytial feeding structures in roots. Development of syncytium is aided by a cocktail of nematode effectors that manipulate host plant activities in a complex network of interactions by post-translational modifications. Previous transcriptome and proteome studies of syncytium generated a wealth of data that is based on abundance rather than activity of transcripts or proteins. However, the function of a protein is reflected by its activity, which is regulated by pH, co-factors, temperature etc. Activity-Based Protein Profiling (ABPP) was recently introduced in plant sciences and has been proven highly useful to display differential enzymatic activities of proteins by using activity based probes (ABPs). ABPs are small molecular probes (biotinylated or fluorescent) that react with a specific subset of enzymes in an activity-dependent manner. To better understand functional proteomics that lead to formation of syncytia, ABPP was conducted on syncytia induced by the beet cyst nematode Heterodera schachtii in Arabidopsis roots. This approach has identified genes and pathways that may play essential roles in feeding site development. Our data show that activity of several papain-like cysteine proteases (PLCPs) and proteasomal subunits that are involved in activation of plant immune responses after pathogen attack is specifically suppressed in sycytia. Moreover, we identified effector proteins from H. schachtii that may target and inhibit PLCPs and proteasome in host plants. Our research contributes to a broader framework in understanding of cyst nematode parasitism and provides a platform to develop novel solutions against these pathogens.

17-7 - Population dynamics of *Globodera pallida* under potato monoculture

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Potato crops are jeopardized by potato cyst nematodes *Globodera* spp. Several examples of suppressive soils where nematode reproduction is constrained by the activity of antagonists have been reported for cyst nematodes. The objective of this study was to monitor population densities of two populations of *Globodera pallida* under potato monoculture. The hypothesis to be tested was that continued culture of potato leads to a suppressive soil against *G. pallida*. Microplots infested with *G. pallida* Pa3, populations Delmsen or Chavornay, were planted to susceptible *Solanum tuberosum* 'Selma' from 2009 until 2013. Population densities of *G. pallida* were determined each year. Cysts were extracted and the contained eggs classified into healthy and diseased. Numbers of total eggs fluctuated during this study, as also did the percentage of diseased eggs, which increased from about 2% (2009) to almost 70% (2012). In fall 2012, soil samples collected from the microplots of both *G. pallida* populations were placed heat-treated or untreated in root observation boxes planted to potato 'Selma' and inoculated with *G. pallida* at 15,000 eggs per box. With first appearance, nematode females were counted weekly. After eight weeks, females and